

AMENDMENTS TO THE CLAIMS

This listing of the claims replaces all earlier versions.

Please amend the claims as follows.

Claim 1. (previously presented) An apparatus to traverse a seabed topographic feature, comprising:

 a subsea pipeline constructed to carry fluids from a first location across the topographic feature to a second location;

 wherein the topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof;

 said pipeline including at least one distributed buoyancy region;

 said pipeline comprising a first unbuoyed pipeline section extending from said first location on a sea floor to said distributed buoyancy region and a second unbuoyed pipeline section extending from said distributed buoyancy region to said second location on a sea floor; and

 said distributed buoyancy region connecting said first and said second pipeline sections in fluid communication.

Claim 2. (cancelled)

Claim 3. (original) The apparatus of claim 1 wherein said distributed

buoyancy region comprises a plurality of discrete buoyancy-providing modules distributed along a length of said pipeline.

Claim 4. (original) The apparatus of claim 1 wherein said distributed buoyancy region comprises a continuous coating of buoyant material.

Claim 5. (original) The apparatus of claim 1 further including a tether system to retain said pipeline in position and to resist forces of undersea currents.

Claim 6. (original) The apparatus of claim 1 wherein said first and said second pipeline sections are negatively buoyant.

Claim 7. (cancelled)

Claim 8. (original) The apparatus of claim 1 further including a first flexure control device at said first location to reduce bending stress and strain in said first pipeline section.

Claim 9. (original) The apparatus of claim 8 wherein said first flexure control device is located proximate to a cliff edge of the topographic feature.

Claim 10. (original) The apparatus of claim 9 wherein said first flexure control device includes a flex joint.

Claim 11. (original) The apparatus of claim 9 wherein said first flexure control device includes a stress joint.

Claim 12. (original) The apparatus of claim 9 wherein said first flexure

control device includes a swivel.

Claim 13. (original) The apparatus of claim 9 wherein said first flexure control device includes an anchor.

Claim 14. (original) The apparatus of claim 9 wherein said first flexure control device is located between said first pipeline section and said distributed buoyancy region.

Claim 15. (cancelled)

Claim 16. (original) The apparatus of claim 14 wherein said distributed buoyancy region is positively buoyant.

Claim 17. (original) The apparatus of claim 9 wherein said first pipeline section is located between said first flexure control device and said distributed buoyancy region.

Claim 18. (original) The apparatus of claim 17 wherein said first pipeline section is taut and is positioned above said first flexure control device.

Claim 19. (original) The apparatus of claim 18 wherein said second pipeline section is negatively buoyant.

Claim 20. (original) The apparatus of claim 9 wherein said second pipeline section extends from said distributed buoyancy region to a second flexure control device located at said second location and configured to reduce bending stress and strain in said second pipeline section.

Claim 21. (original) The apparatus of claim 20 wherein said first flexure control device is located between said first pipeline section and said distributed buoyancy region.

Claim 22. (original) The apparatus of claim 21 wherein said second pipeline section is taut and is positioned above said second flexure control device.

Claim 23. (original) The apparatus of claim 20 wherein said first pipeline section is located between said first flexure control device and said distributed buoyancy region.

Claim 24. (original) The apparatus of claim 23 wherein said first pipeline section is taut and positioned above said first flexure control device, and said second pipeline section is taut and positioned above said second flexure control device.

Claim 25. (currently amended) The apparatus of claim 8 wherein said first flexure control device is located distant to a cliff edge of [[on]] the topographic feature.

Claim 26. (original) The apparatus of claim 25 wherein said first flexure control device is located between said first pipeline section and said distributed buoyancy region.

Claim 27. (original) The apparatus of claim 26 wherein said distributed

buoyancy region is positively buoyant.

Claim 28. (original) The apparatus of claim 25 wherein said first pipeline section is located between said first flexure control device and said distributed buoyancy region.

Claim 29. (original) The apparatus of claim 28 wherein said first pipeline section is taut and positioned above said first flexure control device.

Claim 30. (original) The apparatus of claim 28 wherein said second pipeline section is negatively buoyant.

Claim 31. (original) The apparatus of claim 28 wherein said second pipeline section extends from said distributed buoyancy region to a second flexure control device located at said second location to reduce bending stress and strain in said second pipeline section.

Claim 32. (original) The apparatus of claim 31 wherein said first pipeline section is taut and positioned above said first flexure control device and said second pipeline section is taut and positioned above said second flexure control device.

Claim 33. (original) The apparatus of claim 1 further including a flexure control device at said second location to reduce bending stress and strain in said second pipeline section.

Claim 34. (original) The apparatus of claim 33 wherein said second

pipeline section is taut.

Claims 35-49 (cancelled)

Claim 50. (currently amended) An ~~The apparatus of claim 1 to traverse a seabed topographic feature, comprising:~~

a subsea pipeline constructed to carry fluids from a first location across the topographic feature to a second location;
wherein the topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof;
said pipeline including at least one distributed buoyancy region;
said pipeline comprising a first unbuoyed pipeline section extending from said first location on a sea floor to said distributed buoyancy region and a second unbuoyed pipeline section extending from said distributed buoyancy region to said second location on a sea floor;
said distributed buoyancy region connecting said first and said second pipeline sections in fluid communication; and
wherein said distributed buoyancy region comprises a positively buoyant inverse catenary section.

Claim 51. (previously presented) The apparatus of claim 1 wherein said

distributed buoyancy region is unanchored.

Claim 52. (previously presented) The apparatus of claim 20 wherein said second flexure control device is located proximate to a second cliff edge of the topographic feature.

Claim 53. (previously presented) The apparatus of claim 20 wherein said second flexure control device is located distant to a second cliff edge of the topographic feature.

Claim 54. (previously presented) The apparatus of claim 20 wherein said second flexure control device includes a flex joint.

Claim 55. (previously presented) The apparatus of claim 20 wherein said second flexure control device includes a stress joint.

Claim 56. (previously presented) The apparatus of claim 20 wherein said second flexure control device includes a swivel.

Claim 57. (previously presented) The apparatus of claim 20 wherein said second flexure control device includes an anchor.

Claim 58. (previously presented) An apparatus to traverse a seabed topographic feature, comprising:

a subsea pipeline constructed to carry fluids from a first location across the topographic feature to a second location;

wherein the topographic feature is selected from the group consisting

of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof;

said pipeline including at least one unanchored distributed buoyancy region;

said pipeline comprising a first unbuoyed pipeline section extending from said first location on a sea floor to said distributed buoyancy region and a second unbuoyed pipeline section extending from said distributed buoyancy region to said second location on a sea floor;

a first flexure control device at said first location to reduce bending stress and strain in said first pipeline section; and

said distributed buoyancy region connecting said first and said second pipeline sections in fluid communication.

Claim 59. (previously presented) The apparatus of claim 58 wherein said distributed buoyancy region comprises a plurality of discrete buoyancy-providing modules distributed along a length of said pipeline.

Claim 60. (previously presented) The apparatus of claim 58 wherein said distributed buoyancy region comprises a continuous coating of buoyant material.

Claim 61. (previously presented) The apparatus of claim 58 further

including a tether system to retain said pipeline in position and to resist forces of undersea currents.

Claim 62. (previously presented) The apparatus of claim 58 wherein said first and said second pipeline sections are negatively buoyant.

Claim 63. (cancelled)

Claim 64. (previously presented) The apparatus of claim 58 wherein said first flexure control device is located proximate to a cliff edge of the topographic feature.

Claim 65. (previously presented) The apparatus of claim 58 wherein said first flexure control device is located distant to a cliff edge of the topographic feature.